





'Ulu Propagation Techniques

*For backyard
and commercial
growers*



Technique	<h3>Root sucker transplant</h3> 	<h3>Root cuttings</h3> 	<h3>Adventitious shoot cuttings</h3> 	<h3>Air layering</h3> <p>See step-by-step photo guide below and to right</p> 
Overview	<p>Find shoot growing from root, sever root on either side of shoot, transplant into pot with soil</p>	<p>Gather large section of root ~¾ to 1 inch wide, cut into section 3-4 inches long, pot in soil and keep moist</p>	<p>Encourage shoots from branch or root, take cutting at ~18" high and root in humid conditions</p>	<p>Girdle bark of small (~¾ to 1 inch) shoot, simulate underground conditions with moist medium for 3 months or until rooted</p>
Pros	<p>Simple, low-tech, free</p>	<p>Simple, low tech, free, can make several trees</p>	<p>Relatively low tech, can make high number of cuttings relatively quickly</p>	<p>Self propagating supply of shoots, no damage to tree, makes use of nuisance trees, produces larger starting tree</p>
Cons	<p>Only one tree at a time, damages mother tree, may have low survival rate (relatively inefficient)</p>	<p>Damages mother tree, can be prone to infection and disease because of large wound</p>	<p>Need high humidity infrastructure - either via grow box or misting system</p>	<p>High labor/time investment, supplies needed</p>
Target user(s)	<p>Backyard grower</p>	<p>Backyard grower Small scale commercial farmer</p>	<p>Moderate to large scale farmer</p>	<p>Backyard grower Small scale commercial farmer</p>



Grafting

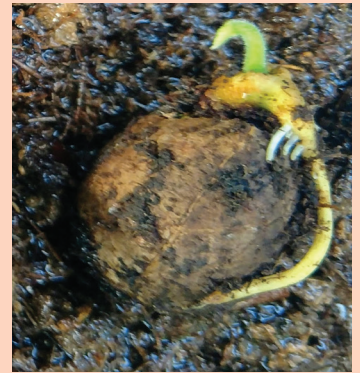


Tissue culture

Source: Murch et al., 2007



Seed



Using root stock from seeds such as breadnut or jackfruit, sever shoot and attach cutting of breadfruit

Grow clonal plantlets from plant tissue cells in sterile media using growth hormones

Sexual propagation; many breadfruit varieties are seedless, some have occasional seeds



Can enhance tree by using superior root stock, can be done at a large scale relatively quickly

Phytopathogenic for international transit, produces large volume of plantlets in small area, supports germplasm conservation

Supports genetic diversity, hybrid crosses, breeding and selection for specific traits like fruit quality, dwarf stature & salt tolerance



Need skill set, if done poorly trees can be prone to infection; cannot use root stock for vegetative propagation later on

High-tech, usually requires laboratory, high volume & profitability entry barriers

Seedlings may not match parent variety and be slow to mature; questionable pollen source adds to the uncertainty

Small to moderate scale commercial farmer

Commercial propagator

Backyard grower

Commercial farmer

Breeding program

Co-Crops



Breadfruit grows well in diversified agroforestry settings, where the planting design can incorporate techniques such as alley cropping, ground covers, windbreaks, and in row canopy plantings to provide shade for young 'ulu trees. Examples of recommended co-crops include winter melon, cassava (e.g. as alley crop), kalo, 'uala (e.g. as groundcover), pineapple, niu (e.g. as in row canopy tree), cacao, ti, uhi (e.g. as a trellised vine up the trees), 'awa (e.g. as an understory) and kō (e.g. as a windbreak).

Glossary of propagation terminology:

Scion material	growing tips of plants used in grafting to propagate known varieties
Bud material	newly emerging leaf buds used in grafting
Rootstock	plant root & stems for attaching graft material
Graft	variety propagation by attaching living branches to growing rootstock
Asexual / vegetative	propagation by growing plant material, not seeds
Sexual	propagation by seeds with genetic recombination from pollination
Root	plant material that absorbs water & nutrients, doesn't photosynthesize, not green, usually found in the ground
Apical	growing upward toward light source
Adventitious shoot	plant buds or stems not at growing branch tips
Clone	genetically identical plant material for consistent variety performance
Cambium	layer of plant cells inside bark of branches & trunk used to transport water & nutrients in sap
Node	swollen ring around plant stem or branch where leaves or buds emerge

For more information visit:

<https://eatbreadfruit.com> |  Hawai'i 'Ulu Cooperative

Breadfruit and breadfruit propagation: a manual for commercial propagation, prepared by Laura B. Roberts-Nkrumah, FAO 2012:
<http://bit.ly/2qxwx4j>

Grow us our daily bread: a review of breadfruit cultivation in traditional and contemporary systems, by Noa Lincoln, Diane Ragone, Nyree Zerega, Laura B. Roberts-Nkrumah and Maxwell Jones, Horticultural Reviews, Volume 46. 2019:
<http://bit.ly/2PfIudM>

In vitro conservation and micropropagation of breadfruit (Artocarpus Altilis, Moraceae), by Susan Murch, Diane Ragone, Wendy Lei Shi, Ali R. Alan and Praveen K. Saxena, Naturwissenschaften 95:99-107, 2008:
<http://bit.ly/2SSPdIA>

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